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09/892,225

06/25/2001

Shunpei Yamazaki

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08/25/2003

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EXAMINER

SONG, MATTHEW J

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 08/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/892,225

Applicant(s)

YAMAZAKI ET AL.

Examiner

Matthew J Song

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## Period for Reply

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2003.  
2a) ☒ This action is FINAL.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.  
2b) ☐ This action is non-final.

## Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.  
4a) Of the above claim(s) 1-4, 8-14, 20-22, 24-28 and 32-34 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 5-7, 15-19, 23 and 29-31 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.  
12) ☐ The oath or declaration is objected to by the Examiner.  
13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.  
14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.  
15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.

- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 5-7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu (US 5,753,541).

Shimizu discloses a method of fabricating a polycrystalline silicon-germanium thin film transistor (TFT), note entire reference, on an insulating substrate, comprising forming an amorphous silicon layer, an amorphous germanium layer and converting the amorphous silicon layer and the amorphous germanium layer into polycrystalline layers (col 3, ln 1-25). Shimizu also discloses the amorphous silicon and germanium layers are formed by plasma CVD (col 3, ln 26-40 and Example 2). Shimizu also discloses both of the amorphous layers are converted into polycrystalline layer by annealing using an ultraviolet laser light, such as an excimer laser (col 3, ln 41-67 and Example 3). Shimzu also discloses a source electrode 2 and a drain electrode 3 and an amorphous silicon film used as an ohmic contact layer 4, this reads on applicant's insulating film covering an electrode, and thereafter forming an amorphous silicon and amorphous germanium layer, which are crystallized by laser light (col 5, ln 1-67).

The sole difference between Shimizu and the instantly claimed invention is the first amorphous layer comprises germanium, where Shimizu discloses forming a second layer comprising germanium. Selection of any order of performing process steps is prima facie

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obvious in the absence of new or unexpected results (MPEP 2144.04). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Shimizu by depositing the germanium layer first and the silicon layer second because order of performing process steps is held to be obvious.

3. Claims 15-17 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu (US 5,753,541) in view of Teramoto et al (US 5,923,966).

Shimizu et al teaches all of the limitations of claim 15, as discussed previously in claim 5, except introducing an element capable of promoting crystallization of silicon into the first amorphous semiconductor film or the second amorphous semiconductor film.

In a laser processing method, note entire reference, Teramoto et al teaches an amorphous Si film **603** formed by plasma CVD on a glass substrate **601**, introducing nickel for promoting crystallization into the surface of the amorphous silicon film, heat treating the amorphous Si film **603**, thereby providing a crystalline Si film **607** and irradiating the crystalline silicon film **607** is irradiated with laser light to further promote the crystallization of the crystalline silicon film **607** (Embodiment 2). Teramoto et al also teaches a KrF excimer laser, a XeCl excimer laser, other excimer lasers, or other means emitting coherent light can be used as a laser (col 33, ln 30-45). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Shimizu with Teramoto et al to promote the crystallization of an amorphous film.

4. Claims 19 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu (US 5,753,541) in view of Teramoto et al (US 5,923,966) as applied to claims 15-16 above, and further in view of Zhang et al (US 5,578,520).

The combination of Shimizu and Teramoto teaches all of the limitations of claim 19, as discussed previously in claim 15. The combination of Shimizu and Teramoto is silent to a CVD apparatus with a turbo molecular pump used in an exhaust means connected to a reaction chamber.

In a plasma CVD apparatus for depositing amorphous silicon, Zhang et al teaches a CVD apparatus 2, where a vacuum evacuation apparatus comprising a turbo molecular pump and a rotary pump connected in series, so that impurity concentration inside the chamber may be maintained as low as possible (Fig 2 and col 6, ln 1-67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Shimizu and Teramoto with Zhang et al to maintain the impurity concentration in the chamber as low as possible.

Also, Applicant is reminded apparatus limitations, unless they affect the process in a manipulative sense, may have little weight in process claims (In re Tarczy-Hornoch 158 USPQ 141).

5. Claims 18 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu (US 5,753,541) in view of Teramoto et al (US 5,923,966) as applied to claims 15-16 above, and further in view of Maekawa (US 6,066,547).

The combination of Shimizu and Teramoto et al teaches all of the limitations of claim 18, as discussed previously. The combination of Shimizu and Teramoto et al is silent to irradiating with a light from one selected from the group consisting of a halogen lamp, a xenon lamp, a mercury lamp, a metal halide lamp as a light source.

In a method of forming a Thin film transistor, note entire reference, Maekawa teaches a transparent substrate of glass or quartz, a step 90 for providing an amorphous film, where silicon, germanium or silicon-germanium alloys are typical amorphous films, for forming a thin film transistor, a step 92 for depositing a layer of an amorphous film, a step 94 for introducing a transition metal to induce rapid crystallization of the amorphous film and a step 96 for rapid thermal annealing to convert the amorphous film into a polycrystalline film (Fig 20 and col 11, ln 1-67). Maekawa also teaches the rapid thermal annealing step includes annealing with a tungsten-halogen lamp, Xe arc lamp and an excimer laser (col 12, ln 1-50). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Shimizu and Teramoto et al with Maekawa because substitution of known equivalents for the same purpose is held to be obvious (MPEP 2144.06).

### *Double Patenting*

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

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provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 5-7, 15-16, 19 and 31 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 7, 50-51, 59-60, 66 of U.S. Patent No. 6,482,684. Although the conflicting claims are not identical, they are not patentably distinct from each other because the difference between the claims of the instant application and US 6,482,684 is the instant claims first amorphous layer comprising germanium and a second amorphous semiconductor layer, where US 6,482,684 claims an amorphous semiconductor film and forming a film comprising germanium, which is inherently amorphous because the film is formed on an amorphous film using conventional deposition techniques, i.e. plasma CVD. The sole difference between the claims of the instant application and US 6,482,684 is the order the semiconductor thin films are deposited. Selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results (MPEP 2144.04). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify US 6,482,684 by depositing the germanium layer first and the silicon layer second because order of performing process steps is held to be obvious.

Referring to claims 19 and 31, Applicant is reminded apparatus limitations, unless they affect the process in a manipulative sense, may have little weight in process claims (In re Tarczy-Hornoch 158 USPQ 141).

***Response to Arguments***

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8. Applicant's arguments filed 5/27/2003 have been fully considered but they are not persuasive.

The 102 rejection based on Maekawa is withdrawn.

Applicant's argument that the order of layers is crucially important for this kind of crystal growth is noted but is not found persuasive. Shimizu discloses forming a first amorphous layer of silicon and a second amorphous layer of germanium and differs from the claimed invention of a first amorphous layer containing germanium and a second amorphous layer of silicon. The rejection is based on the mere selection of any order of process steps is prima facie obvious in the absence of new or unexpected results (MPEP 2144.04). Applicant alleges the order of the layers is crucially important for this kind of crystal growth, as taught on page 28, line 20 through page 31, line 1. The passage cited by applicant merely teaches the interaction of a metal element in amorphous layers of silicon and germanium. The passage does not teach any critically to the order of the layers. Also, the passage is directed to describing the interaction of a metal element and claim 5 does not require a metal element, therefore is not relevant to the rejection of claim 5. Furthermore, new or unexpected results are required to properly traverse this rejection, note MPEP 2144.04, which are not provided.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).



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In this case, Teramoto et al teaches adding a metal to promote the crystallization of an amorphous film.

### *Conclusion*

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Noguchi et al (JP 04-168769) teaches an amorphous semiconductor layer **2** of SiGe or Ge is formed on a substrate and an amorphous silicon layer **3** is formed on the layer **2** and heat treated for a predetermined time, thus the amorphous semiconductor layer is crystallized and a polycrystalline semiconductor layer **21** and a polycrystalline silicon layer **31** made of polycrystalline silicon germanium or polycrystalline germanium are subjected to solid growth (Abstract).

Canon (JP 59-129859) teaches an amorphous layer **102** composed of Ge or Ge and Si and a second layer of amorphous Si (Abstract).

Hitachi (JP 64-053408) teaches depositing an amorphous germanium layer on a silicon substrate and depositing an amorphous silicon layer thereon and crystallizing the germanium layer (Abstract).

Sanyo (JP 03-284882) teaches laminating amorphous silicon layers **41** and amorphous germanium layers on a substrate and annealing at 300-400°C to crystallize only the germanium layer and not the silicon layer which crystallizes at about 500°C (abstract).

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10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

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Matthew J Song  
Examiner  
Art Unit 1765

MJS  
August 1, 2003

09/08/03 15:10:14  
NADINE G. NORTON  
PRIMARY EXAMINER

NADINE G. NORTON  
PRIMARY EXAMINER

*Nat*